

## BOOK REVIEWS

**Language and Species. Derek Bickerton. 1990. The University of Chicago Press, Chicago, IL. 297 p. \$13.95 paper.**

This is a unique and fascinating book. It is a defense of Bickerton's hypothesis that the rather large gap in control over the environment, conscious thought, and linguistic abilities separating humans from apes is largely a result of the third of these differences, namely, language.

Bickerton points out that all vertebrates and many invertebrates are able to represent the world not only by means of a sensory system that can discriminate among important stimuli, but also by means of categories that are one step removed from the sensations that gave rise to them. Moreover, each species has its own adaptive view of reality, its own "primary representational system (PRS)." It is an evolutionary advance upon this PRS that, Bickerton believes, provided both the basis for human language development and human superiority over other animals.

This view rejects the conventional wisdom that humans developed language in order to communicate, and that their linguistic abilities are related to systems of communications among other species, like the dance of bees. Bickerton believes that the gulf between the best system of communication developed by other species and human language capacity is too great to be accounted for by evolutionary theory.

On the other hand, the development of language as a representational system can, he believes, be traced back to its evolutionary origins. What is required as an intermediate step is a representational system capable of processing the information that was generated by the PRS. The products of this representational system, including referents for nouns and verbs, could serve as a protolanguage, characterized by some features of language but devoid of syntax.

Bickerton cites as evidence for the existence of such a protolanguage the mode of expression found in trained apes, children younger than age two, adults deprived of language in their early years, and speakers of pidgin. He refers to these phenomena as the "fossils" of language, and he proposes that they support the view that either at the beginning or at the end of the *H. habilis* period there was a state of readiness for language. The development of protolanguage gave hominids the immediate advantage of communicating. Even more importantly, according to Bickerton, it provided conceptual tools for representing the external world.

Evidence from artifacts, such as cave paintings, bladed tools, and moon calendars, suggests that there was an abrupt change toward the end of the *H. erectus* period and the beginning of the *H. sapiens*. This also appears to be the time when a crucial mutation enabled *H. sapiens* to develop a secondary representational system, that is, a true language with syntactic structure.

Major portions of *Language and Species* are devoted to a detailed documentation of the characteristics of language, how they differ from the characteristics of protolanguage, and how one could evolve from the other.

These portions of the text are sometimes rather technical, and they are not always easy reading. But they are vital for the argument that it is our secondary representational system that gives us the command that we have over our environment, our thoughts, and our means of expressing them.

Bickerton's final chapter, "The Nature of the Species," reminds us that as we use our representational power to gain control over our environment, we need to remind ourselves that we are a part of that environment, so that we may need to "learn how to live in balance with a world that we cannot change without changing, even perhaps destroying, ourselves" (p. 254).

This brief summary of the main thesis of the book does not begin to do justice to the careful reasoning and theorizing that has gone into it. Bickerton is a good teacher as well as a careful writer, and he appears to relish engaging in a genuinely interdisciplinary effort. The experience of reading *Language and Species* is akin to sharing an intimate conversation with someone who has a complex and important story to tell and who is willing patiently to explain each detail in turn. It could very well serve as a model for a course on the philosophy of science. Meanwhile, it fills an important niche in the sparse literature on the evolution of human language and thought.

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**Intensive Care: Medical Ethics and the Medical Profession. Robert Zussman. 1992. University of Chicago Press, Chicago, IL. 252 p. \$29.95 cloth.**

This work presents the results of sociological fieldwork conducted in two intensive care units of very large teaching hospitals, "Outerboro" affiliated with a New York City medical school, and "Countryside" associated with a Boston medical school. Zussman spent 114 days between 1985 and 1987 making rounds, reviewing charts, and interviewing patients and staff at Outerboro. At Countryside, he used the same 19-day rotation system for participant observation, spending 57 days in the unit, making rounds and interviewing patients, staff, and patients' friends or family members.

Robert Zussman offers a largely qualitative and exclusively empirical construction of the structure, function, personnel, objectives, and endemic problems of these two intensive care units. Zussman argues for the necessity and development of a sociology of medical ethics. Following Weber, he makes extensive use of the differences between philosophical concepts of ethics and their practical medical construction and application. Zussman presents an image of conflict between competing cultures in contemporary medicine. A "culture of rights" articulates the principles and objectives of medical ethics: patient autonomy, informed consent, just allocation of scarce resources, etc. A "culture of the ward" presents "an even looser set of orientations derived from the direct experience of medical practice as well as from long medical tradition and directed far more to the expression of medical authority" (p. 12).

Policy analysts, medical ethicists, and sociologists will be interested in the translation that themes of the culture of rights undergo in their expressions in the strategies, goals, and conduct of those enculturated in the ICU. Zussman offers a sustained sociological exposition of issues of informed patient and proxy consent. From the vantage point of ethicists or prospective patients, his descriptive accounts are occasionally chilling and often riveting. They reveal the scope and strength of medical authority and privilege. Physicians avoid implementing the decisions of patients and their proxies by: raising challenges to their mental status; identifying proxies with divergent values or practices as objects of treatment themselves; appealing to what they seem to view as patients' and proxies' invincible ignorance, and revoking patients' and proxies' entitlements to determine care by claiming exclusive authority over "technical" questions. Zussman also describes physicians' exercise of a much more subtle brand of power by determining—and occasionally engaging in frank manipulation of—the information presented to patients or proxies. While Zussman is to be commended for his careful and balanced account of decision making in intensive care units, his attempts to provide a sociological analysis of applications of the ethical doctrine of informed consent would have been improved by an extensive and thorough empirical analysis of the kinds, amounts, timing, and quality of information provided to proxies or patients.

While Zussman's treatment of the culture of rights is interesting, it is eclipsed by his stunning portrayal of the culture of intensive care medicine. Readers familiar with this literature may be reminded of Charles Bosk's *Forgive and Remember: Managing Medical Failure* (University of Chicago Press, 1979). Zussman offers a careful, thorough, and sensitive description of these intensive care units. The actors in these dramas are described in minute detail. The reader becomes engrossed, the reality of the study or library recedes and one begins to hear and feel the movement and tense drama of these units. This vivid portrayal can prompt both horror and sympathy. Zussman offers a dramatic description of patients' "disappearance" in intensive care units. Their status as persons or human beings wanes, new identities are constructed for them by medical staff. Patients as persons are not the objects of care, neither are their bodies in any comprehensive sense. Staff respond to physiological crises and not to the broader medical context of a patient's diseases. They not only determine their interventions by test results, they come to "treat" these numbers. The medical director of the Countryside ICU asserted, "Good doctors never look at the history of the patient. . . . They just look at the numbers." He insisted, "I don't talk to patients." A patient's private physician confirmed this orientation by waving a piece of paper with recorded laboratory values and asserting, "This is the patient" (p. 32-33). While Zussman carefully balances these appraisals with attention to the diminished neurological functioning of intensive care patients, one can't help but be chilled by intensivists' descriptions of their work and patients as "a little bit of a science project" or their statements that "In a way it's almost like veterinary medicine" (p. 31-33).

Yet readers also come away with a deep appreciation for the stresses of intensive care medicine and the limitations of its resources. Physicians struggle with the human costs of their interventions. They want to pull patients through crises but often feel helpless when it comes to resolving their underlying diseases. They are repulsed by some of the aspects of their interventions and speak of medical "torture." In one of the most powerful chapters in the book, an Outerboro intern describes a dream in which he had been invited to his attending's house for dinner. He walked down to the basement and there were,

these penguins in his basement and they were sort of sitting on this table. There was ice scattered around, clearly like the ice was supposed to be there to make them more comfortable so they could live in the proper habitat. But the ice was sort of sitting on the table and melting, and . . . it was just a matter of time until they died. . . . There was also a blender on the table. So I put one of the penguins into the blender and took a whole bunch of ice and put it into the blender as well, because by mixing them all up in the cold circumstance I could presumably prolong their life. I turned on the blender and spun the penguin around and then stopped the blender. And I had apparently succeeded in what I was trying to do, because he was now in a very cold environment. But he was in a pool of blood. Then I woke up. (p. 110)

Robert Zussman's book is an important addition to the literature of both medical sociology and medical ethics. Those who teach undergraduate or graduate courses in these areas may be interested in adopting it. It provides an intimate and gripping portrayal of the terms of life and death in intensive care units. Although it is neither written nor intended to serve as a patient guide or a "survival manual," prospective patients and their families could learn a great deal by reading it.

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**The Dicotyledoneae of Ohio Part 3. Asteraceae: The Vascular Flora of Ohio, Volume Two. T. Richard Fisher.<sup>1</sup> Original drawings by Sharon Ames Glett. Foreword by Tom S. Cooperrider. 1988. The Ohio State University Press, Columbus, OH. 280 p. \$65.00.**

For readers unfamiliar with some of the terminology regarding names of vascular plant families, this book is a floristic treatment of the Compositae which is equivalent to the alternative name, Asteraceae, or Sunflower Family, for the State of Ohio. Common plants of this family are sunflowers, asters, goldenrods, thistles, ragweeds, daisies, and dandelions. This book represents the third part of Volume Two, *The Dicotyledoneae*, which is a portion of a 4-part treatment of the vascular flora of Ohio.

The Ohio Flora project was initiated in 1951 by the late Professor E. Lucy Braun of Cincinnati, OH, under the auspices of The Ohio Academy of Science. Dr. Braun's first contribution, the *Woody Plants of Ohio* (1961), recently

was reprinted in paperback by The Ohio State University Press, Columbus (1989). That book was followed by the unnumbered first volume of the Ohio flora, *The Monocotyledoneae: Cattails to Orchids* (1967) by Dr. Braun with the Gramineae by Dr. Clara G. Weishaupt, even though no geographical reference to Ohio is given in the title. Unlike the *Monocotyledoneae*, the book reviewed here, the *Asteraceae of Ohio*, does include the name of the state in its title, but the long-used and widely applied familiar historic name, Compositae, is absent. The family name Compositae describes more adequately those plants characterized by having a composite cluster of usually small flowers crowded together on a broad platform or receptacle, rather than does the more unfamiliar alternative term Asteraceae, which is the family name ending in -aceae and is based on the type genus *Aster*. Nomenclatural convention establishes that the name of every family ends uniformly and that each family name is based on a type genus. In this case, the usage of either family name is permitted. Considered the most morphologically complex and highly evolved of the dicot plants, this family contains the most species in the world, the most alien species in the United States as well as in Ohio, and the most aggressive plants—those considered as “weeds.”

These composite plants have been the life-long favorites of Professor Fisher, whose serious study of them began in the 1950s with monographic and biosystematic investigations in *Heliopsis*, followed in the 1960s by research on *Silphium*. After nearly four decades of work, his book has become a reality.

Dr. Fisher's approach to plant identification, developed in over 30 years of teaching Local Flora and Field Botany, is evident in his concise keys where each lead usually consists of one definitive, easily observed, contrasting characteristic. A few leads contain an additional two or three features which further aid the keying process. In addition to having a key to the traditional ten tribes of the family, Fisher has developed a key to six assemblages, based mostly on the kinds of flowers in each type of head and the features of the pappus. For each assemblage, no fewer than seven genera and no more than 22 genera are included in any one key. This key appears to be quite well prepared, easily usable and workable, and provides a fresh approach to a means of identifying large numbers of genera in a family—the Compositae Family—here containing 75 genera.

The original line illustrations of the species by Sharon Ames Glett, when seen in the original before publication were well executed and sharply drawn. Unfortunately, the outlines of leaves and lines representing the veins are barely visible in many of the published illustrations, particularly in those of the first half in my copy of the book. These features have disappeared in their reduction to page size and during the printing process. In my copy, this loss of detail is especially noticeable in the illustrations of certain species in *Vernonia*, *Kuhnia*, *Grindelia*, *Solidago*, *Aster*, *Erigeron*, and *Anaphalis*. Other genera, including *Silphium*, *Helianthus*, *Cirsium*, *Sonchus*, and *Hieracium*, are much clearer, darker, and evenly printed. Furthermore, it appears that the numbers (x, x1) indicating the size reductions, placed at the base of each species illustrated,

are appropriate for the original drawings rather than the final size of the drawings printed in the book. It is also not clear whether the illustrations are of the entire plant or merely a part or branch of the plant. Many drawings appear as if they represent an entire plant, especially those that have basal leaves. However, many illustrations show the stem as if cut from some remaining part of the plant. In these drawings it is not clear how much or what portion of the plant is depicted. If a branch is intended, then the size reduction designated could be appropriate.

The distribution of nearly every species included is mapped for the state of Ohio. A dot is placed in the center of those counties, whence herbarium specimens have been seen. The maps are pleasing to view, as the dot is of an appropriate size relative to the county boundaries. The appearance of these maps represents much improvement over those with smaller dots in the two books on the Ohio flora by E. Lucy Braun.

Fisher's book is further well-executed in that each taxon is treated in species rank, with native ones in boldface type and non-native or foreign ones in lightface type, thereby providing a ready reference for this information. When subdivided into intraspecific categories, these named taxa are appropriately treated within the commentary of the species, rather than given equal status with the treated species. Of the 276 species in the book, 184 are native and 92 are non-native, demonstrating that approximately 33% or one third of the Ohio species of Compositae are of foreign origin. Of the 276 species treated, common names are provided for 196, or 71%. Common names are available for all of the species treated, and the remaining ones should have been added for completeness.

Those users of books who have the compulsion for writing annotations in the margin will find more than ample space for this purpose. Much extraneous white space in the margin occurs throughout the book, which could have been used effectively by increasing the print size, so that the book could be more easily read. However, the format design that has resulted usually allows for the text, illustration, and map of each species to appear on the same or opposite pages, which is a very desirable feature.

Those readers seeking a historical review of previous studies and literature on Ohio Compositae will not find it in this book. Some comments of historical significance are made with the taxa *Hymonoxys acaulis* (Lakeside daisy), *Helianthus x kellermanii* (Kellerman's sunflower), *H. occidentalis* (few-leaved sunflower), *Milkania scandens* (climbing hempweed), and *H. x luxurianus* (a hybrid sunflower). The first known discussion of the Compositae family in Ohio, a popular account, prepared by William A. Kellerman (Bull. Agric. Coll. Ext. Service, Ohio State Univ. 3: 5-9), described the heads with many tiny flowers upon the broad receptacle. The earliest systematic treatments of Ohio Compositae considered only portions of the family. Emery C. Leonard (Ohio J. Sci. 18: 33-58) published on the Astereae, containing descriptions and keys for 12 genera and 67 species. Nellie F. Henderson (Ohio J. Sci. 25: 85-96) provided descriptions and keys to 16 genera and 48 species belonging to the Lactuceae

(Chichorieae). In his *Revised Catalog of Ohio Vascular Plants*, John H. Schaffner (Ohio Biol. Surv. Bull. 25, 1932) listed 88 genera and 307 species for the entire family. These numbers are slightly higher than those treated in Fisher's book. Schaffner's list was followed by a very usable field or low power hand lens key to 138 genera of Compositae for northeastern North America by Richard A. Popham (Ohio Biol. Surv. Bull. 38, 1941). His publication preceded initially by 20 years the treatment of Compositae in three editions of the *Vascular Flora of Ohio* by Clara G. Weishaupt (1960, 1968, 1971).

The scientific names used throughout the book reflect those names appearing in other recent taxonomic studies of the various genera. Species nomenclature is quite consistent with that of other floristic recent treatments of Compositae, for example Cronquist (1980) in his treatment of the *Asteraceae in the Vascular Flora of the South-eastern United States*. Recent publications use the names *Aster borealis* (Torrey and Gray) Prov. (Ill. Nat. Hist. Surv. Bull. 34: 139-194) for *A. junciformis* Rydb., and *Hieracium piloselloides* Vill. (Mich. Bot. 17: 41) for *H. florentinum* All. *Senecio antennarifolius* Britt. is not reported in Fisher's treatment, even though it is included in the keys to the Compositae in Clara G. Weishaupt's *Vascular Plants of Ohio* (1971).

One of the long-awaited volumes on the dicots of Ohio has now come to fruition in this third part, the Asteraceae (Compositae). It is a useful treatment and valuable reference for the identification, illustration, and distribution of the species in Ohio. As acknowledged in the book, much credit goes to certain individuals in the Ohio Legislature, the Ohio Biological Survey, The Ohio Department of Natural Resources (Division of Natural Areas and Preserves), The Ohio State University, Kent State University, Bowling Green State University, and The Ohio Academy of Science for assistance to make this publication possible. This book contains valuable information on the Ohio Compositae. It should be part of the library of every serious student studying the vascular flora of Ohio.

<sup>1</sup>Dr. T. Richard Fisher is the executive director of the non-profit Schedel Foundation which maintains a public 26-acre garden and arboretum at Elmore, OH. Living there in the 1882 brick mansion, he is developing the grounds and conducting tours for visitors to the estate.

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**Terrestrial Ecosystems through Time: Evolutionary Paleocology of Terrestrial Plants and Animals.** Anna K. Behrensmeyer, John D. Damuth, William A. DiMichele, Richard Potts, Hans-Dieter Sues, and Scott L. Wing. 1992. University of Chicago Press, Chicago, IL. 568 p. \$75.00 cloth, \$29.95 paper.

Evolutionary biology is concerned not only with what actually happened in the course of life's history, but also with how evolution operates as a process. Evolutionary theory informs us that natural selection is of primary importance in the development and maintenance of

adaptations to ecological conditions. It is a simple inference that we could test this proposition throughout evolutionary history using correlations among ecological conditions and the traits of organisms, if such data were available. This is a major premise of paleoecology (Gould 1976), and an underlying theme of this book. The book is the result of a conference (Evolution of Terrestrial Ecosystems Conference, Washington, DC. 1987), and most chapters are apparently written by one or two people, with editing and revision by most of the conference attendees.

The book opens with three introductory chapters. The first gushes about the potential of paleoecology for testing ideas in evolutionary biology, the second is a fine chapter on limitations imposed by taphonomy, and the third proposes a rather tentative idea about ignoring taxonomic (and presumably phylogenetic) information in looking for ecological patterns. The latter I object to because, in the end, one needs the phylogenetic information to do a proper statistical analysis to demonstrate the patterns (Harvey and Pagel 1991, Grafen 1992).

This book is an important contribution in its role as a major historical review of the literature on terrestrial ecosystems. The final four chapters extensively detail ecological associations of the geological periods, complete with maps of the known geography at each period. For full impact, each chapter requires an extensive familiarity with the taxonomy of plants and vertebrates to gain the full effect (thus, written for paleontologists), though neontologists such as myself are helped somewhat in the final chapters with taxonomic appendices and the fact that more familiar recent taxa begin to make their appearances. The book established temporal and geographical associations between plant and vertebrate taxa and emphasizes their mutual ecological associations, in combination with changes in abiotic conditions. It is to the book's credit that invertebrate taxa are also reviewed, although the comparatively spotty literature (and spotty fossil record) ensures that limited space is devoted to these organisms.

The most interesting pattern to emerge is the absence of any evidence of herbivory during early macrophyte radiation. Instead, terrestrial animals were either predators or detritivores (perhaps largely fungivores?), waiting for primary producers to die before eating them. It seems odd that such a widespread and defenseless resource as plants would be politely unexploited for so many millions of years. But, it seems equally odd that if cryptic herbivory were present, then the only plant defenses must have been chemical, since no morphological evidence of defenses (nor any direct evidence of herbivory, such as chewed tissues with the evidence of scarring) have shown up early in the fossil record. The second most interesting result to emerge is what contemporary ecologists have shown experimentally: evidence of major changes in ecological associations during the Paleocene imply that communities are structured quite loosely. Loss, addition, or replacement of several species in an ecosystem has had little impact on overall structure of communities, with only occasional exceptions, whereas changes in abiotic factors have had dramatic impacts (for example, the evolution of protection against desiccation lead to seeds and the invasion of dry upland in the "seed ferns"). That

communities are primarily structured by abiotic conditions is not new information—it can be found in any general ecology text—but at least it is gratifying to see the agreement.

In its role as a first test of historical predictions of evolutionary biology, as touted in the first chapter, this book falls far short. Establishing correlations between traits of organisms and ecological conditions in the fossil record isn't as easy as it first sounds, and there are four main requirements that should be met. First, to go beyond armwaving, traits and ecological conditions must be measured. Second, there ought to be some attempt at replication, else any "correlation" is merely coincidence. Third, proper correlation requires random sampling, else the correlations may be artifacts of the sampling process. And fourth, phylogeny needs to be considered in constructing the correlations, or a trait that evolved once in an ancestral organism might be accidentally treated as several statistically independent instances of the trait at a later time period, after the group has radiated (Harvey and Pagel 1991, Grafen 1992).

In general, the book does not live up to this level of rigor. As an outsider to the discipline, I was surprised most by the apparent reluctance of paleoecologists to emphasize quantification and replication, and the book only gives lip service to these fundamental issues before moving on to summarize conclusions about ecological relationships. Apparently, serious attempts to make more than qualitative and anecdotal assessments of ecological relationships have been made only within the last several years. Random sampling and its role in establishing correlations receives a more honest treatment in a large chapter on taphonomy headed by Behrensmeyer. This is a clear and well-reasoned chapter, and it points out the different kinds of sampling biases that are associated with different conditions under which organisms may

become fossilized. It is unfortunate that the authors of later chapters did not appear to acknowledge these issues when arriving at their own conclusions, and indeed, interpretive caveats only reappear in the very last paragraphs of the book. The book's analyses never approach the level of quantification where actual correlations could be calculated, so the statistical issues of incorporating phylogenetic data never enter the picture directly. However, phylogeny ought to be accounted for even when subjective assessments of ecological patterns are made, and apparently this was not addressed.

I wanted this book to teach me not only some facts and inferences about the history of terrestrial life, but also a bit about making and evaluating such inferences for myself. Its chapters appear to be organized for these goals. I was disappointed because there was no direct critical review of the literature, only a narrative of the literature's conclusions and the unintegrated introductory chapters. Consequently, I don't really feel any of the "conclusions" were well established. Perhaps this could only be expected of a volume authored by virtually the whole community of terrestrial paleoecologists—it helps no one to be criticized in his own book. Terrestrial paleoecology has its apologists; perhaps now it is ripe for a few outspoken critics.

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